

TWO NEW SPECIES OF *ASPLENIUM* FROM SOUTHERN AFRICA

A. F. BRAITHWAITE

(Botany Department, University of Nottingham.)

ABSTRACT

Cytotaxonomic observations are recorded on *A. ramlowii* Hier., *A. blastophorum* Hier. and material related to each of these species which is described as *A. schelpei* and *A. parablastophorum* respectively.

UITTREKSEL

TWEE NUWE SOORTE *ASPLENIUM* VAN SUIDELIKE AFRIKA

Sitotaksonomiese waarnemings word aangeteken oor *A. ramlowii* Hier., *A. blastophorum* Hier. en materiaal wat betrekking het tot hierdie twee soorte, wat beskryf word as *A. Schelpei* en *A. parablastophorum* onderskeidelik.

Cytotaxonomic studies on *Asplenium ramlowii* Hier., *Asplenium blastophorum* Hier. and material related to each of these species from southern Africa have suggested the presence of two additional taxa.

Typical *A. ramlowii* is a tetraploid species having 72 bivalents at meiosis whilst some morphologically allied material from Southern Rhodesia and the Transvaal, South Africa is octoploid with twice this number of chromosomes. The octoploid specimens represent a hitherto undescribed species for which the name *A. schelpei* is proposed. The second new species is based on some tetraploid material from the Melssetter District, Southern Rhodesia which resembles the octoploid *A. blastophorum*. It is nevertheless readily distinguished from the latter species and is described here as *A. parablastophorum*.

The chromosome number, locality and spore size of the living representatives of each of the four species which have been available for cytological examination may be found in the appendix.

A. ramlowii Hier. Eng. Jahrb., 46, 372, 1911.

This is rather a distinctive tetraploid species with a creeping rhizome, clothed in light brown papery rhizome scales up to 10 mm long, and bearing short stiff linear-lanceolate fronds. The lamina is broadest about the middle and the lower pairs of pinnae are gradually reduced towards the base (fig. 1a). The pinnae vary from an almost entire condition in small specimens to a deeply pinnatifid condition in larger more luxuriant specimens.

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Ecologically it favours rather open habitats often growing on rocks, in rock crevices or in grassland among boulders.

It is found in the Matobo, Melsetter, Umtali, Makoni and Salisbury Districts of Southern Rhodesia, Mozambique and Tanzania.

A. schelpei A. Braithwaite species nova.

Rhizoma breve repens, paleis ferrugineis clathratis concoloribus linearibus usque ad 7 mm longis, marginibus paucis projecturis filiformibus munitis. *Frondes* caespitosae rigidae coriaceae. *Stipites* (5—) 8—15 (—24) cm longi squamosi atrobrunnei sed aliquando viridescentes in superficiebus versus laminam. *Lamina* (7—) 9—20 (—30) cm longa, 4—9 cm lata, oblong-lanceolata, imis quintis paribus pinnarum inter se aequalibus vel vix reductis versus basale par, bipinnata; rhachidis sparsim squamata, pars infima per 1/2 vel 2/3 longitudinis in pagina abaxiale atrobrunnea, cetero viridis. *Pinnae* 7—15 jugatae usque ad 5 cm longae, 2.5 cm latae, elongato-trapeziformes, in superficiebus glabrae nitidae florido-virides in paginis inferis sparsim fibrillosae impolitae pallidiores virides, 1—5 pinnulis infra apicem lobatum. *Pinnulae* rotundato-cuneatae vel rotundato-obtrullatae, apicibus irregulariter dentatae non profunde et saepe vadosae lobatae. *Sori* indusiati, 5—12 mm longi, inferne paginam pinnulae vel loborum pinnae fere omnino obtegentes. *Sporae* monoletae 38—50 μ longae (ordo mediis 42—47 μ); perispora cristis tenuibus anastomosantibus usque ad 12 μ latis. Chromosomatum numerus $n = 144$; reproductio sexualis.

TYPE: South Africa, Transvaal, Pilgrims Rest Division, New Chum Falls nr. Pilgrims Rest. In rock crevices above the Falls. 27/12/60. *Braithwaite* 140. (BM holotype; BOL Herb. *Braithwaite*, isotypes).

Rhizome short creeping, clothed in reddish brown clathrate concolorous linear scales up to 7 mm long, bearing a few filiform projections at the margins. *Fronds* tufted stiff and coriaceous. *Stipes* (5—) 8—15 (—24) cm long, scaly, dark brown but becoming green on the upper surface towards the lamina. *Lamina* (7—) 9—20 (—30) cm long, 4—9 cm wide, oblong-lanceolate, the lowermost five pairs of pinnae equal in length or only slightly reduced towards the basal pair, bipinnate; rachis sparsely scaly and dark brown on the lower 1/2 or 2/3 of the abaxial surface, green elsewhere. *Pinnae* 7—15 pairs, up to 5 cm long, 2.5 cm wide, elongate-trapeziform, glabrous and shiny bright green on the upper surface and sparsely fibrillose and matt paler green on the under surface, with 1—5 pinnules below a lobed apex. *Pinnules* rounded cuneate or rounded obtrullate with irregularly shallowly dentate apices which are often slightly lobed. *Sori* indusiate, 5—12 mm long, covering almost completely the undersurface of the pinnules and pinnae lobes. *Spores* monolete, 38—50 μ long (range of means 42—47 μ); perispore with thin anastomising wing up to 12 μ wide. Chromosome number $n = 144$; reproduction sexual.

The following herbarium specimens may be attributed to *A. schelpei*:

SOUTH AFRICA

Transvaal

Pilgrims Rest Division: Top of falls by town of Sabie, *Wager* 34 (PRE); Kruger National Park, Numbi-Nek, on S. side of ridge in rock clefts, c. 2 000', *Schiff* 31 (PRE); Kruger National Park, Pretoriuskop area, Numbi. Indonga or damp places, 2 000', *Schiff* 3456 (PRE); Kruger National Park, Thlalbye. Damp places in kloof, *Schiff* 4207 (PRE); Bourkes Luck Potholes nr. Pilgrims Rest. In deep rock crevices along top of ravine. *Braithwaite* 220 (BM, BOL).

Zoutpansberg Division: Sibasa, wet rocks, 2 500', *Junod* 4598 (PRE) Sibasa, *Junod* s.n. (PRE).

SOUTHERN RHODESIA

Umtali District: At base of precipice M'pemb. In grass on solid granite wall *Chase* 3446 (SRGH); Eastlands. On rock face in gorge near P.E.A. border. 3 200' *Chase* 3939 (BOL, SRGH); Zimunya's Reserve *Chase* 3948 (SRGH); Murakwa's Hill Commonage. 3 900' mixed coll. with *A. ramlowii* *Chase* 4394 (SRGH); Murakwa's Hill, Site I. In light shade among small boulders. 4300' *Chase* 5688 (BOL, PRE, SRGH); Murakwa's Hill, Site II. Hilltop in crevices of boulders away from sun. 4 300' *Chase* 5689 (BOL, PRE, SRGH); Zimunya's Reserve. In shade in crevices among boulders, S. slopes of Mt. 3 200' mixed coll. with *A. ramlowii*, *Chase* 6074 (SRGH); Mt. Currie Farm. In crevices of boulders and rocks on mt. S.W. of Jenya Mt. 3 400' mixed coll. with *V. ramlowii*, *Chase* 6579 (SRGH); Marakwa's Hill, Site III. *Williams* s.n. (UMT 7) (BM, BOL); Murakwa's Hill, Site Williams s.n. (UMT 12) (BM, BOL).

This new species resembles *A. ramlowii* but is distinguished by its shorter, darker and narrower rhizome scales, longer and broader fronds with the lowermost pairs of pinnae of a similar width or only slightly reduced towards the basal pair and by its larger, more dissected pinnae with distinct rounded pinnules. (fig. 1).

The two species are also closely allied ecologically and where their distributions overlap in the Umtali District of Southern Rhodesia they may be found in close proximity, particularly in areas such as Murakwa's Hill and Zimunya's Reserve. There is no direct evidence available at present for natural hybrids between the two species but in view of their close proximity, the discovery of interspecific hexaploid hybrids might perhaps be expected in these localities.

A. schelpei also shows some less obvious but nevertheless significant morphological affinities with *A. splendens*, which is a tetraploid species confined to South Africa. It shares with this species longer and broader fronds than those found in *A. ramlowii* and also larger, more dissected pinnae with rounded pinnules.

The precise relationships of *A. schelpei* with *A. ramlowii* and *A. splendens* have yet to be determined but on morphological evidence alone there are grounds for suggesting that both the tetraploids have been involved in the origin of the octoploid.

The distribution of *A. schelpei* extends from the south-eastern Transvaal, South Africa northwards to the Umtali District, Southern Rhodesia while *A. ramlowii* is found in Tanzania, Mozambique and in Southern Rhodesia as far



FIG. 1.

Silhouettes of *Asplenium* fronds. All one quarter natural size. a) & b) *A. ramlowii* Williams s.n. (HL 8), Kwakasipu, nr. Umtali, Southern Rhodesia. a) from a cultivated plant. b) from a wild collection. c), d) & e) *A. schelpei* All fronds from wild material. c) Braithwaite 140 New Chum Falls, nr. Pilgrims Rest, Transvaal, South Africa. d) Williams s.n. (UMT 7) Murakwas Hill, Umtali, Southern Rhodesia. e) Braithwaite 220 Bourkes Luck Potholes, nr. Pilgrims Rest, Transvaal, South Africa.

south as the Matopo and Melssetter Districts and *A. splendens* is confined to South Africa extending from eastern Cape Province to the Zoutpansberg in the northern Transvaal. *A. schelpei*, therefore, bridges the gap between the ranges of the two tetraploids. The distribution pattern of the three species perhaps lends further support to the suggestion that the parentage of *A. schelpei* involves *A. ramlowii* and *A. splendens*.

A cytogenetic investigation which includes all three species is currently being undertaken to determine their precise inter-relationships and in particular to determine the mode of origin of *A. schelpei*.

A. blastophorum Hier., Eng. Jahrb., 46, 378, 1911.

The two representatives of this widely distributed African species which have been cytologically examined are both octoploid (see appendix) and possess con-

spicuously gemmiferous fronds (fig. 2a). The buds normally appear in mature fronds near the apex but in larger specimens they may also arise along the rachis or even on the upper surface of the lower pinnae. A careful search of herbarium material over the entire range of the species indicates that it is consistently gemmiferous.

A. parablastophorum Braithwaite species nova.

Rhizoma repens, paleis usque ad 5 mm longis, $\frac{3}{4}$ mm latis, lineari-subulatis clathratis atrobrunneis, cellulis in parte mediana vinosis crassis parietibus, tenuescens et lutescens versus marginem, marginibus paucis filiformibus munitis. *Frondes* usque ad 60 cm longae coriaceae non-gemmiferae. *Stipites* 30—35 cm longi. *Lamina* 22—30 cm longa, 13—19 cm lata, conspicue triangularis, tripinnata, 9—11 paribus pinnarum suboppositis. *Pinnae* c. 10 cm longae 5 cm latae, elongato-trapeziformes, patulae, usque ad 10 pinnulis infra apicem lobatum. *Pinnulae* minores cuneate-spathulatae, apicibus rotundatis et dentatis; pinnulae majores elongatae 1—3 segmentis infra apicem lobatum; segmentia pinnulis minoribus similia. *Sporae* monoletae, 28—37 μ longae (ordo mediis 32—33 μ); perispora cristis tenuibus anastomosantibus usque ad 9 μ latis. Chromosomatum numerus $n = 72$; reproductio sexualis.

TYPE: Southern Rhodesia, Melsetter District, Chimanimani Mts. Forest on Timbiri river ± 1 mile up from Haroni. Frequent on ft. floor or occasionally as low level epiphyte. 2 000' 13/2/58 Mitchell 381 (BOL, holotype; SRGH, isotype)

Southern Rhodesia, Melsetter District, Lusitu River, Lusitu Nature Reserve. May 1959 Ball 1 (SRGH, paratype)

Rhizome creeping, covered in dark brown clathrate linear-subulate scales up to 5 mm long and $\frac{3}{4}$ mm broad, with cells in the central part with thick deep red walls becoming thinner and yellow towards the margin, and bearing a few filiform projections at the margins. *Fronds* up to 60 cm long coriaceous and non-gemmiferous. *Stipes* 30—35 cm long. *Lamina* 22—30 cm long, 13—19 cm wide, conspicuously triangular, tripinnate, with 9—11 subopposite pairs of pinnae. *Pinnae* c. 10 cm long 5 cm broad, elongate-trapeziforme, spreading with up to 10 pinnules below a lobed apex. Smaller pinnules cuneate spathulate with rounded dentate apices; larger pinnules elongate with 1—3 segments below a lobed apex; segments similar to the smaller pinnules. *Spores* monolete, 28—37 μ long (range of means 32—33 μ); perispore with a thin anastomising wing up to 9 μ wide. Chromosome number $n = 72$; reproduction sexual.

The single cytological record for this species (see appendix) is based on a chromosome count from one of two plants raised from spores taken from the specimen collected by Ball in the Government Herbarium at Salisbury. Unfor-

unately both of these plants have been lost before adequate herbarium specimens could be preserved. The illustration in fig. 2b is based on a tracing from the specimen designated as the holotype in the Bolus Herbarium at the University of Cape Town.

This new tetraploid species resembles *A. blastophorum* but is readily distinguished by its non-gemmiferous and broader triangular fronds bearing much more finely dissected pinnae with cuneate- spathulate pinnules and pinnule lobes. (fig. 2)

It is at present known only from the Melsetter District of Southern Rhodesia.



FIG. 2.

Silhouettes of *Asplenium* fronds. All one quarter natural size. a) *A. blastophorum* Braithwaite 48 Ngoya Forest, Port Durnford, Natal, South Africa. b) *A. parblastophorum* Mitchell 131 Chimanimani Mts., Melsetter District, Southern Rhodesia.

APPENDIX.

Details of the material which has been cytologically examined.

<i>Species</i>	<i>Locality</i>	<i>Collector & Number</i>	<i>Cytology</i>	<i>Spore size*</i>
<i>A. ramlowii</i> Hier.	Kwakasipu, nr. Umtali, Southern Rhodesia.	Williams s.n. (HL 8)	n = 72	37,3 ± 3,89
<i>A. schelpei</i> A. Braith. sp. nov.	New Chum Falls, Pilgrims Rest, Transvaal, S. Africa.	Braithwaite 140	n = 144	43,8 ± 3,90
	Bourkes Luck Potholes, nr. Pilgrims Rest, Transvaal, South Africa.	Braithwaite 220	n = c.144	45,3 ± 3,88
	Murakwas Hill, Umtali, Southern Rhodesia.	Williams s.n. (UMT 7)	n = 144	47,5 ± 3,90
	Murakwas Hill, Umtali, Southern Rhodesia.	Williams s.n. (UMT 12)	n = 144	46,3 ± 3,91
<i>A. parablastophorum</i> A. Braith. sp. nov.	Lusitu R., Lusitu Nature Reserve, Melsetter Distr., Southern Rhodesia	Ball 1.	n = 72	32,2 ± 1,85
<i>A. blastophorum</i> Hier.	Ngoya Ft., Port Durnford, Mtunzi Div., Natal, South Africa.	Braithwaite 48	n = 144	39,4 ± 3,92
	Bandula Ft., Manica Distr., Mozambique.	Chase 6839	n = 144	40,5 ± 2,05

* Means for 100 spores.

Herbarium material of all the plants listed, with the exception of *A. parablastophorum* (see text), will be deposited at the British Museum (Natural History), London and the Bolus Herbarium, Cape Town.